

MAA4211: REAL ANALYSIS AND ADVANCED CALCULUS I

Instructor: Jeremy Booher

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Instructor's Office: LIT 488

Course Time: MWF Period 3, Fall 2024

Course Location: FLINT 121

Course Webpage: on canvas (<https://elearning.ufl.edu/>)

Office Hours: will be posted on canvas, and by appointment

“I mean the word proof not in the sense of the lawyers, who set two half proofs equal to a whole one, but in the sense of a mathematician, where half proof = 0, and it is demanded for proof that every doubt becomes impossible” ”

Carl Friedrich Gauss

1. COURSE DESCRIPTION

A rigorous treatment of the foundations of calculus including the real numbers; limits; sequences; continuity; differentiation; and integration. The focus is on gaining a deep understanding of concepts introduced in calculus classes, and proving results from the foundations. This course is designed to prepare students for graduate school in mathematics or related fields where the ability to read, write, and discover proofs is essential.

2. LEARNING RESOURCES

2.1. **Textbook.** “Understanding Analysis”, Stephen Abbot, 2nd edition.

2.2. **Other References.** The standard “intense” reference for this topic is Rudin’s “Principles of Mathematical Analysis”. There are a variety of free textbooks recommended by the American Institute of Mathematics at this link.

2.3. **Office Hours.** You are encouraged to come to office hours if you struggling: I am happy to help. You are also encouraged to come to office hours if you are doing well or are bored: I am happy to talk about math more generally and tell you interesting things. If the default times do not work for you, please contact me and we can find an alternate time.

3. EXPECTATIONS AND GRADING

Many of the policies in this class are inspired by research in education that shows that “active learning” is more effective than traditional lectures. In particular, this means that class-time will be spent solving problems and discussing concepts in addition to lecturing. The goal is to have time in class, where guidance is available, to practice synthesizing and applying concepts and to practice solving problems. Reading the textbook will be essential to obtain a complete overview of a topic and to see details omitted during class.

3.1. Reading Assignments. Readings will be assigned, and should be completed *before* the topic is discussed in class. The goal is not to master the material at this stage, but to learn the basics and be ready to participate in activities during class. Some questions to guide your reading will be provided. These assignments are an important part of your homework. After class, revisit the readings to solidify your understanding.

3.2. Homework Exercises. Practicing solving problems is vital to learning mathematics. You should focus on writing clear proofs and explaining your reasoning. It is fine (and fun) to work with other students on solving the problems. But you should write your solution down on your own, and be able to reproduce it. It is fine to look in your notes or a textbook for background material related to the problem. Do not search the internet for solutions to that particular question. This will only cheat you out of a learning opportunity.

3.3. Exams. There will be a three in-class exams, tentatively schedule for September 20th, October 16th, and November 22nd.

3.4. Grades. Your final grade will be based on the following:

- 50% from homework;
- 50% from the in-class exams, not weighted equally.

To allow for a bad day and to reward improvement over the semester, your lowest exam score will be weighted less. In particular, the two best exam scores will contribute 20% each to your final grade, while the worst exam score will contribute 10% of your final grade. Grades will be no lower than the following:

$$\begin{array}{l} A : [93, 100]\% \quad A- : [90, 93]\% \quad B+ : [87, 90]\% \quad B : [83, 87]\% \quad B- : [80, 83]\% \\ C+ : [77, 80]\% \quad C : [73, 77]\% \quad C- : [70, 73]\% \quad D : [60, 70]\% \quad E : [0, 60] \end{array}$$

3.5. Grading Disputes. Any grading problems must be brought to my attention within one week of the work being returned.

4. OTHER POLICIES

4.1. Communication. Course Announcements will be posted on Canvas. It is the student's responsibility to make sure they receive notifications for this course. For personal matters, students should e-mail the instructor via their official UF e-mail address.

4.2. Attendance. Attending classes are vital to the learning process. As such, your attendance is expected at every class. You are expected to have looked at the assigned readings ahead of time and actively participate in class discussion and activities.

4.3. Make-Up Policy for Homework/Exams. Make-up homework/exam work is allowed only when written evidence of an official University excused absence is provided (<http://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/>).

The instructor must be notified as soon as possible, preferably *before* the homework due date or exam with as much advanced notice as possible. A detailed account of the situation and supporting documents are required.

4.4. Honesty Policy Regarding Cheating, Plagiarism, etc. UF students are bound by *The Honor Pledge* (<http://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/>) which states,

We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment."

The Student Conduct Code (<http://sccr.dso.ufl.edu/process/student-conduct-code/>) specifies a number of behaviors that are in violation of the honor code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please or consult with the instructor in this class.

4.5. Accessibility and Accommodations. Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the Disability Resource Center by visiting <https://disability.ufl.edu/students/get-started/>.

It is important for students to share their accommodation letter with their instructor and discuss their access needs as early as possible in the semester.

4.6. Online Course Evaluations. Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <http://gatorevals.aa.ufl.edu/students/>.

Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <http://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <http://gatorevals.aa.ufl.edu/public-results/>.

4.7. Change. Information contained in the course syllabus, other than the grade and absence policy, may be subject to change with advance notice, as deemed appropriate by the instructor.